Chemical Monitoring

There are literally hundreds of chemicals and numerous methods that can be used for testing water quality. In most rural areas of Virginia, including Fauquier County, **nitrogen** and **phosphorus** are the two chemicals most frequently monitored in streams and ponds. Nitrogen and phosphorus are components of fertilizer, animal manure, and wastewater from sewage treatment plants. Too much nitrogen and phosphorus can lead to excessive plant growth in aquatic ecosystems, and these nutrients play a major role in the water quality problems of the Chesapeake Bay.

Breaking through ice to collect a water sample at the Fauquier Outdoor Lab.

Aquatic organisms such as fish and insect larvae need oxygen to survive, so testing for **dissolved oxygen** is a common procedure. Time of year, plant growth, and water movement all have an effect on oxygen levels. **Temperature** and **pH** are also common tests that are usually quick and easy to perform.

Ideally, students would visit a local pond or stream to carry out water testing experiments. However, many of the tests can easily be done in the classroom using water brought by students from ponds and streams in their neighborhoods. Also, water from classroom aquariums, drinking fountains, and even bottled water can be tested.

Most water testing procedures do involve glass components and chemical products, so adult supervision and basic safety requirements are mandatory. The John Marshall SWCD will usually have a limited supply of chemical testing kits suitable for demonstrations, field days, or field trips. District personnel can help teachers write and apply for grants if long term projects are planned.

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Water Monitoring Programs

Offered by

John Marshall Soil & Water Conservation District

The John Marshall SWCD has the tools, equipment, and expertise to assist classroom teachers in conducting meaningful watershed experiences. Whether in the classroom or in the field, the District can help plan and conduct a variety of biological and chemical testing activities geared toward almost any grade level and SOL.

Biological Monitoring

Biological monitoring involves surveys of living organisms. Surveying for macroinvertebrates is a common practice that is fun for students and involves a minimum of equipment and supplies.

Macroinvertebrates are animals without backbones that are large enough to be seen without microscopes or magnifying lenses. Examples of macroinvertebrates include insect larvae, aquatic worms, snails, and crayfish. Macroinvertebrates vary in their tolerance to pollution, and their populations can be indicative of overall water quality.

Dragonfly larvae are common in local ponds.

Ponds are usually sampled with dip nets, while streams are usually sampled with seines. The District has all the equipment necessary for a macroinvertebrate monitoring adventure.

Macroinvertebrate monitoring usually involves transporting students to a local pond or stream. If this is not possible, the Leaf Pack project may fill the bill for a classroom experience.

The **Leaf Pack** method involves placing mesh bags containing leaves in streams or ponds for 3-4 weeks. During this timeframe, macroinvertebrates will inhabit the mesh bags to feed on the leaves or on other macroinvertebrates. The bags can be collected and brought to the classroom where the macroinvertebrates will be sorted and identified. This method still involves a pond or stream, but a teacher or parent can help the students fill the bags in the classroom, then take the bags to a local water body. The John Marshall SWCD has all the equipment needed for a leaf pack experiment, and can help locate ponds and streams for bag placement.

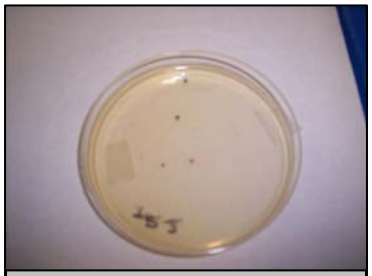
All methods of macroinvertebrate monitoring can be carried out any time of year. In fact, populations of many macroinvertebrates are highest in winter.

Plastic bags are used to carry leaf packs back to the classroom.

Macroinvertebrate studies can be linked to many different science related SOLs and almost any grade level.

E. coli Monitoring

E. coli monitoring is a new activity offered by the District. E. coli is a type of bacteria associated with feces of warm blooded animals. Most of the streams listed as impaired (polluted) in Fauquier County made the list because of E. coli contamination. Sources of E. coli include farm animals, wildlife, birds, pets, and malfunctioning septic systems.



Bacterial colonies grow in 24-48 hours.

Samples of water are mixed with a media and bacterial colonies are grown in Petri dishes. This is an excellent classroom activity as students can collect water samples from ponds and streams in their neighborhoods and bring the samples to school for testing.

The District usually maintains a small supply of test kits for demonstration purposes. For schools desiring to do large scale testing, or for students working on science projects, E. coli test kits are readily available. A box that contains materials for ten tests costs about $25.